Math 295 - Spring 2020
Homework 10

This homework is due on Wednesday, March 25. Most problems are adapted from Munkres's *Topology*.

1. Consider the *square metric*

$$\rho(\mathbf{x}, \mathbf{y}) = \max(|x_1 - y_1|, \ldots, |x_n - y_n|),$$

   for $\mathbf{x} = (x_1, \ldots, x_n), \mathbf{y} = (y_1, \ldots, y_n) \in \mathbb{R}^n$.

   (a) Show that ρ is a metric on $\mathbb{R}^n$.

   (b) Show that ρ induces the standard topology on $\mathbb{R}^n$.

2. Show that every metric space is Hausdorff.

3. Let X be a metric space with metric d, and A be a subspace of X.

   (a) Show that $d|_{A \times A}$ is a metric on A.

   (b) Show that $d|_{A \times A}$ induces the subspace topology on A.

No extra problem for graduate credit this week.